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Patented Apr. 16, 1901.

A. SEDMIHRADSKY.
KNITTING MACHINE.

(Application filed Aug. 14, 1899.)

(No Model.)

2 Sheets—Sheet 1.

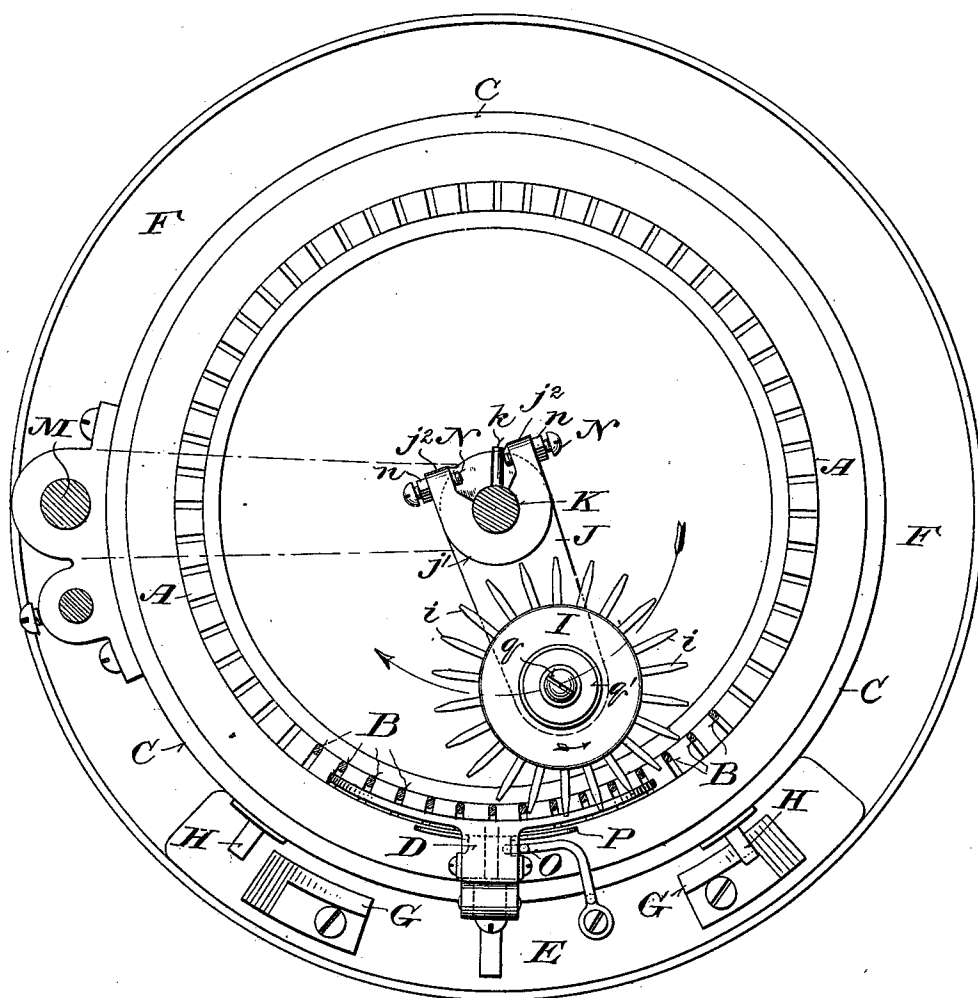


Fig. 1.

Witnesses:
Geo. W. Young.
Chas. L. Goss.

Inventor:
Adolph Sedmihradsky,
By Wm. H. H. Smith & Co.,
Attorneys.

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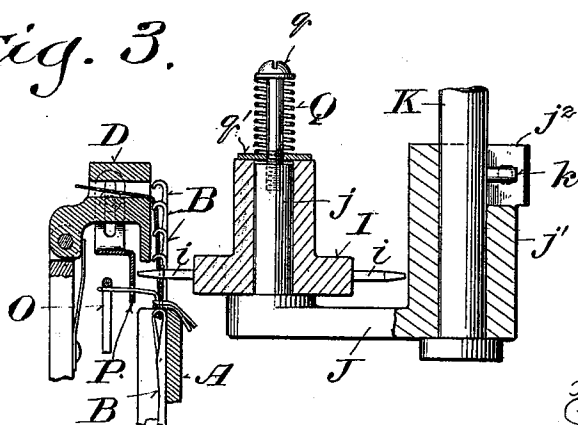
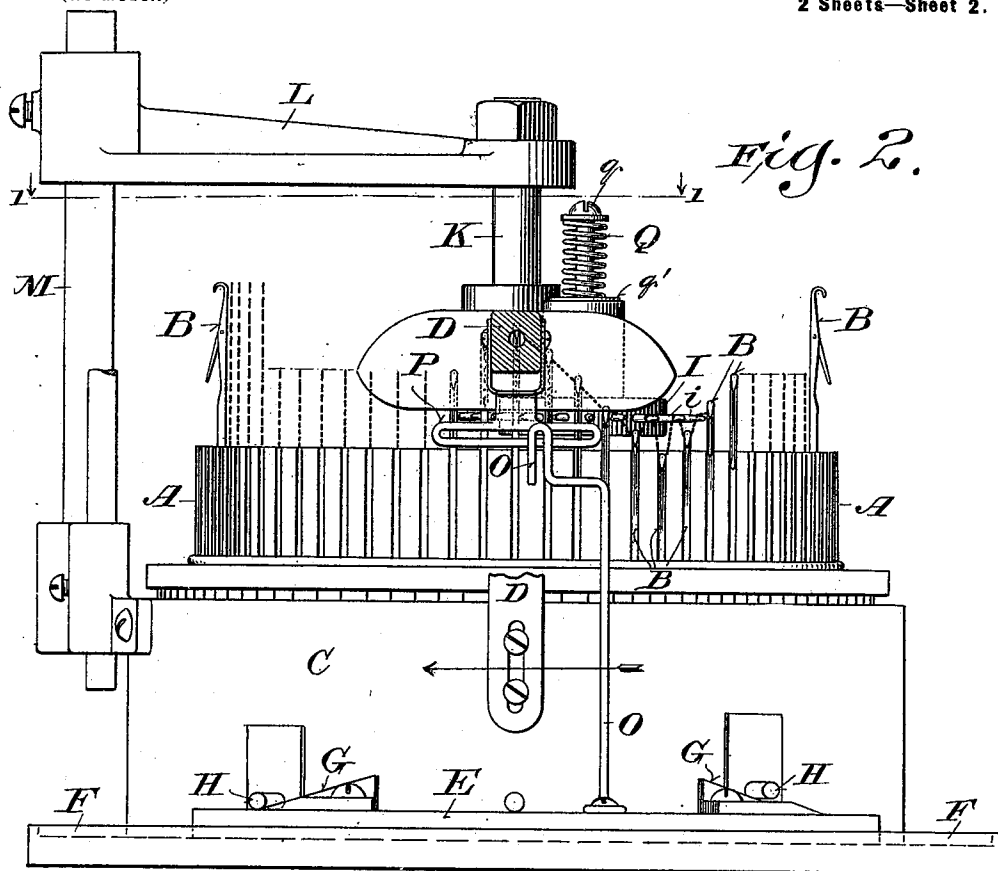
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2 Sheets—Sheet 2.

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Witnesses:
Geo. W. Young.
Chas. L. Goss

Inventor
Adolph Sedmikradsky
Big Apple, London, South Bottom, Wales
Offenweys.

UNITED STATES PATENT OFFICE.

ADOLPH SEDMIHRADSKY, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO
KALAMAZOO KNITTING COMPANY, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 672,182, dated April 16, 1901.

Application filed August 14, 1899. Serial No. 727,118. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH SEDMIHRADSKY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to that class of knitting-machines which are designed to form loops on one side of the knitted fabric. Its objects are, primarily, to adapt a machine of this class for narrowing and widening—as, for example, to knit the heels and toes of socks or the fingers of gloves.

It consists in certain novel features of construction and in the arrangement and combination of parts hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a horizontal section on the line 1 1, Fig. 2, and a plan view of a part of a circular-knitting machine to which my improvements are applied, only so much of the machine being shown as is necessary to a clear understanding of my invention. Fig. 2 is a side elevation of substantially the same part of the machine as is shown in Fig. 1; and Fig. 3 is a sectional detail of the looping-wheel, yarn-guides, and parts of the machine immediately associated therewith.

For the purpose of illustration I have shown my improvements as applied to a circular-knitting machine, although with slight modification they are equally applicable to straight machines.

Referring to the drawings, A designates the needle-cylinder, formed in its outer side with grooves to receive and guide the needles B B.

C is the cam-cylinder, adapted to turn on the outside of the needle-cylinder and provided with cams (not shown) of the usual or any suitable construction and arrangement to produce the required movements of the needles in the grooves of the needle-cylinder for forming the stitches and loops in knitting.

D is the yarn-guide for the upper or loop

yarn. It is attached by a bracket to the cam-cylinder C and is movable therewith.

E is a curved plate or segment of a ring loosely fitted and movable endwise in a groove or channel in the upper side of a stationary ring F, attached to the machine-bed, which is not shown. It is provided with two oppositely-turned inclines or wedges G G, which by engagement with pins or projections H H are adapted to reverse the stitch-cams in the usual way when the movement of the cam-cylinder is reversed.

The foregoing parts are constructed and arranged as usual in machines of this kind.

I is a looping-wheel formed or provided on its periphery with regularly-spaced teeth *i*, adapted to project on one side between the needles B, as shown in Fig. 1. This wheel is mounted and adapted to turn upon a vertical pin *j* on the outer end of an arm J, formed at its inner end with a hub or sleeve *j'*, which is mounted and adapted to turn a limited distance on a vertical rod K. The rod K is carried centrally with relation to the needle-cylinder by a radial arm L, which is rigidly connected with the cam-cylinder C by an upright post or standard M. The arm L is preferably attached to the standard M adjustably, so that it may be turned and raised or lowered thereon in order to set the rod K exactly in line with the axis of the needle-cylinder and the looping-wheel in the required position with relation to the needles B. The rod K is made fast at its upper end in the overhanging end of the arm L, and it is formed or provided on one side with a pin or projection *k*, which extends into an opening or recess formed in the hub or sleeve *j'*. In horizontally-perforated ears *j''*, formed with said sleeve on opposite sides of said opening or recess, are threaded screws N N, the points or inner ends of which constitute adjustable stops for limiting the angular movement of the arm J on the rod K. These stop-screws are provided on the outside of the ears *j''* in which they are threaded with jam-nuts *n n* for locking them in position when they are properly adjusted. The teeth of the wheel I may be conveniently formed of round wire, pointed or tapered at their outer ends and

secured at their inner ends in holes drilled radially in the periphery of the wheel.

O is a guide for the lower or stitch yarn. It is attached to and carried by the cam-shifting plate E and may be conveniently made, as shown, of wire bent or formed at its upper end into a loop or eye. In connection with this guide the machine is preferably provided with a horizontally slotted or elongated auxiliary guide P for the lower or stitch yarn. This auxiliary guide is adjustably attached to and movable with the upper-yarn guide D. Q is a spiral spring placed around a screw *q*, threaded in the upper end of the pin *j* and bearing at its upper end against the head of said screw or an interposed washer and at its lower end against a washer *q'*, resting against the hub of the looping-wheel I. It serves as an adjustable friction brake or resistance to the rotary movement of said wheel upon the pin *j*.

In the drawings only a few of the needles B are shown in Figs. 1 and 2, omitted needles being indicated by dotted lines in Fig. 2 to illustrate and explain the operation of the machine.

The machine, as shown in the drawings, operates as follows: For knitting a tubular web—as, for instance, in knitting the straight portions of the legs and feet of socks—the cam-cylinder C, with the yarn-guides and looping-wheel, are turned by hand or power (the driving connections not being shown) continuously in one direction, according to the ordinary mode of operating machines of this kind. For narrowing or widening or knitting a flat web on a tubular web—as, for instance, in knitting the heels and toes of socks or the fingers of gloves—a part of the needles B are pulled up out of operative position, as shown at the sides of the machine in Fig. 2. The cam-cylinder is then turned by hand back and forth, so as to cause the yarn-guides and looping-wheel to pass back and forth in opposite directions by the needles that are retained in operative position. In Figs. 1 and 2 of the drawings the parts are shown in the relative positions they assume when the cam-cylinder is turned in the direction indicated by arrows on said figures. The needles B are first raised and then lowered by the cams above and below their normal position, as shown in Fig. 2. The upper or loop yarn passes from the upper guide D below and into engagement with the hooks of the needles when they are elevated and is drawn down by them as they descend over the teeth *i* of the looping-wheel I, as clearly shown in Fig. 2. The stitch-yarn passes through and from the lower guides O and P below the teeth of the looping-wheel into the hooks of the needles as they descend. The two yarns are thus drawn by the descending needles through the row of loops previously formed, the upper yarn being supported over the teeth of the looping-wheel and forming loops on the inner side of the fabric. When the yarn-

guide and looping-wheel have passed the end of the row of needles that are in operation, the movement of the cam-cylinder is reversed, the upper-yarn guide D and the auxiliary lower-yarn guide P advance a limited distance in the opposite direction with the cam-cylinder, while the cam-shifting plate E, with its inclines G G, the looping-wheel I, and the lower-yarn guide O remain quiescent until the advance cam-shifting pin or projection H clears the adjacent incline G and the other pin or projection H rides upon and is lifted by the other incline G. This reverses the stitch-cams in the usual way, so that the needles will, as before, be first raised and then lowered above and below their normal position. When the pin or projection *k* is brought by the reverse movement of the rod K into engagement with the stop N opposite that with which it engages, as shown in Fig. 1, the looping-wheel I, having shifted its position with relation to the yarn-guide D and cams, so that its teeth will pass underneath the upper yarn and between the needles, by which it is engaged as they descend, will be carried with the cam-cylinder in the direction opposite that indicated by the arrow. During the reversal of the cams, as above explained, the lower-yarn guide O is shifted with the cam-reversing plate E, so as to properly deliver the lower yarn below the teeth of the looping-wheel to the needles as they descend with the loop-yarn engaged by their hooks. The operation is thus repeated, the looping-wheel I and the lower-yarn guide O dwelling and shifting their positions with each reversal of the movement of the cam-cylinder. For narrowing additional needles are lifted out of operative position and for widening additional needles are lowered into operative position in the usual way.

I do not wish to be understood as limiting myself in the application of my improvements to a machine having the specific construction and arrangement of parts shown in the drawings and hereinbefore described for the purpose of illustration, as they are applicable with slight modifications, that will be apparent to those skilled in the art to which my invention pertains, to straight reciprocating machines and to circular machines of different kinds.

I claim—

1. In a knitting-machine, the combination with needles, a needle-support, and a reversible needle-operating device, of a rotary looping-wheel having teeth which project on one side thereof between the needles while they are elevated by the needle-operating device and movably connected with said needle-operating device, which is capable of a limited initial movement in either direction independently of said looping-wheel, substantially as described.

2. In a knitting-machine, the combination of a needle-cylinder, a cam-cylinder for operating the needles, and a toothed looping-wheel

revolvably mounted upon an arm which is carried by and adapted to turn a limited distance on a support in the axial line of the needle-cylinder, substantially as described.

5 3. In a knitting-machine, the combination of a needle-cylinder, a cam-cylinder, a rod arranged axially within the needle-cylinder, a radial arm pivotally mounted upon said rod and provided with opposing adjustable stops
10 on opposite sides of a lateral projection on said rod, and a looping-wheel rotatably mounted on said arm and provided with teeth which are adapted to project on one side between the needles while they are ele-
15 vated by the cam-cylinder, substantially as described.

4. In a knitting-machine the combination with the needles, fixed needle-support, a movable cam-carrier provided with reversible
20 cams for operating said needles, and an upper or loop yarn guide movable with said cam-carrier, of a toothed looping-wheel connected and movable with the cam-carrier in position to pass under the loop-yarn and be-
25 tween the needles as they descend, the cam-carrier having a limited initial movement in both directions while said looping-wheel remains quiescent, and a shifting lower or
30 stitch yarn guide adapted to dwell during a limited interval when the movement of the cam-carrier is reversed and then to move with said carrier, substantially as and for the purposes set forth.

5. In a knitting-machine the combination
35 with the needles, needle-support, cam-carrier provided with reversible cams, and upper or loop yarn guide movable with the cam-carrier, of a toothed looping-wheel connected and movable with said cam-carrier, and adapted

to dwell and shift its position with rela- 40
tion to said cams and yarn-guide when the movement of the cam-carrier is reversed, a lower or stitch yarn guide also connected and
movable with the cam-carrier and adapted to
45 dwell and shift its position with relation to the other guide and the cams when the movement of the cam-carrier is reversed, and a horizontally-elongated auxiliary guide for the
lower yarn located between said shifting
50 guide and the needles and movable with the upper-yarn guide with relation to which its position is constant, substantially as and for the purposes set forth.

6. In a knitting-machine the combination with the needles, needle-supporting cylinder, 55
cam-cylinder provided with reversible cams, means for automatically reversing said cams when the movement of the cam-cylinder is reversed, and an upper-yarn guide movable
60 with and having a fixed relation to the cam-cylinder, of a rotary toothed looping-wheel, a rod carried by the cam-cylinder in line with its axis and adapted to turn therewith, and
an arm mounted radially on said rod and
65 carrying said looping-wheel at its outer end, said arm having adjustable stops on opposite sides of a projection on said rod whereby said
looping-wheel is caused to dwell when the
70 movement of the cam-cylinder is reversed and while it turns a limited distance, substantially as and for the purposes set forth.

In witness whereof I hereto affix my signature in presence of two witnesses.

ADOLPH SEDMIHRADSKY.

Witnesses:

LOUIS HEILBRONNER,
MAX THAL.